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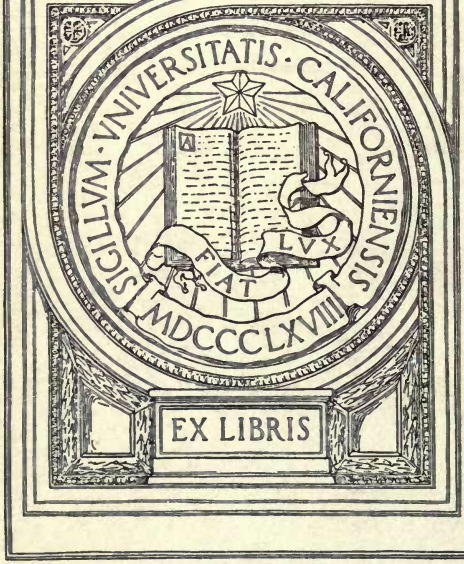
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Thawing Frozen Water Pipes Electrically

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THAWING FROZEN WATER PIPES ELECTRICALLY

A locality which has enjoyed years of snowy winters occasionally finds itself in the midst of a cold snap with no snow to protect the ground from freezing. If water pipes have not been uniformly located beneath the frost line, the result will be an epidemic of frozen water pipes. Unless relieved, this soon results in actual hardships to the people in the affected houses, which can be relieved only by re-establishing water service. Frequently the pipe is frozen at the curb cock, or where the pipe crosses the parking strip to the street, or perhaps it is frozen just outside the wall where it enters the house. In any event, to get at the pipe to thaw it with a torch requires more or less excavating in frozen dirt and then perhaps the pipe isn't frozen where it was thought to be. This method also leads to unnecessary exposure of the pipe to further freezing. Taking into account the hard and disagreeable work and the length of time and expense incurred the digging out method is very unsatisfactory.

The ideal method of thawing frozen water pipes is by electricity. This has an advantage for every disadvantage of the other methods. It is quick, taking but a few minutes to thaw out a hundred feet of pipe. It can be used on long stretches at a time and can be used wherever the pipe is metal. It will reach places inaccessible by other means. It does not require the disturbance of anything on the premises, nor that the exact location of the frost be found. Furthermore it is comparatively cheap where there is any amount of thawing to be done.

The description and tables following are taken from an actual pipe thawing outfit used in the city of Pullman, Washington, during very cold spells when the ground has been frozen deeper than usual. The outfit used, consisted of a sled on which was mounted a set of transformers such as were used for lighting service. These were so connected that the line voltage was transformed from 2300 to 110 or 55 volts. Power was taken from the 2300 volt city service on the

EXCHANGE

poles by means of two No. 10 wires reaching from the pole to the set of fuse cutouts at the sled, as shown in Figure 1. This wire was carried on reels on the rear of the sled. Only enough wire was reeled off to reach the pole, then it was stretched up tight, and connection

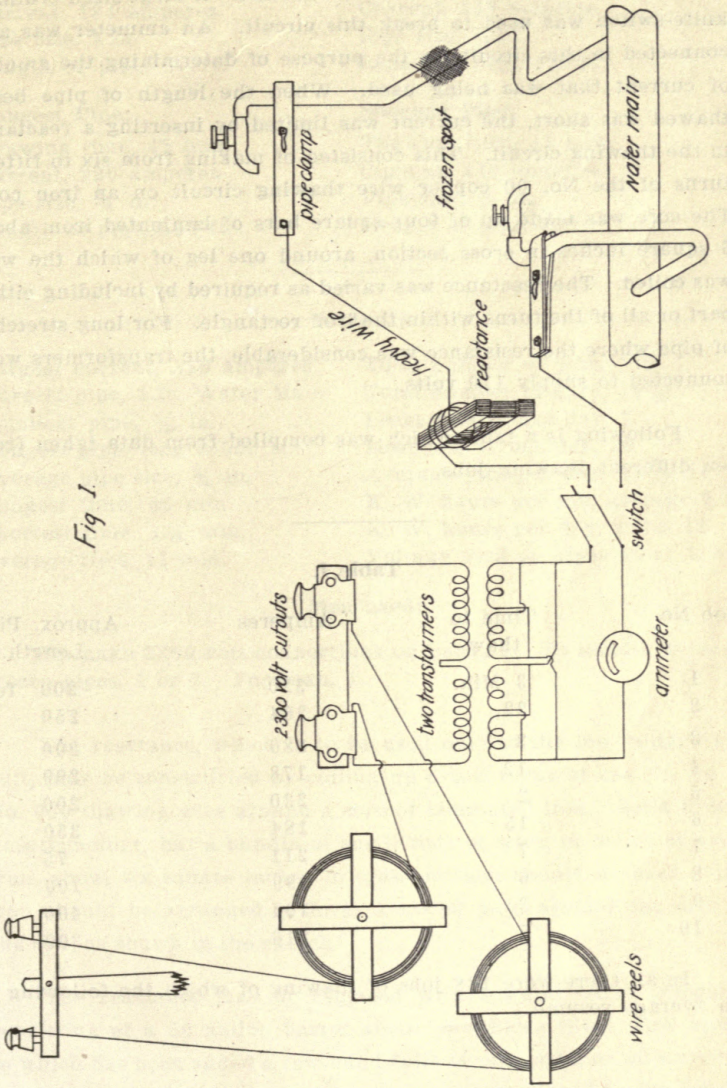

Fig. 1.

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made from a plug receptacle on the inside end of the coil to the cut-outs and from there to the transformers. The current used on the pipes was taken from the 110 or 55 volt secondaries and carried over large copper wire about No. 00 B. & S. in size. A large sized ordinary knife-switch was used to break this circuit. An ammeter was also connected in this circuit for the purpose of determining the amount of current that was being used. When the length of pipe being thawed was short, the current was limited by inserting a reactance in the thawing circuit. This consisted of making from six to fifteen turns of the No. 00 copper wire thawing circuit on an iron core. The core was made up of four square bars of laminated iron, about 6 square inches in cross section, around one leg of which the wire was coiled. The reactance was varied as required by including either part or all of the turns within the iron rectangle. For long stretches of pipe where the resistance was considerable, the transformers were connected to supply 110 volts.

Following is a table which was compiled from data taken from ten different thawing jobs.

Table I.

Job No.	Time to thaw	Amperes	Approx. Pipe Length.
1	3 Min.	320	200 feet
2	22	264	250
3	3	280	200
4	12	178	300
5	2	230	200
6	15	184	350
7	7	211	75
8	6	199	100
9	3	194	400
10	5	216	300

In all there were 138 jobs of thawing of which the following is an average resume.

Table II.

Longest Job:	**Shortest Job:**
Thawing time, 65 min.	Thawing time, 1¼ in.
Current, 184 amperes	Current, 288 amperes
Pipe size, 2 in.	Pipe size, ¾ in.
Length of pipe, 275ft.	Length of pipe, 150 ft.
Longest Pipe:	**Shortest Pipe:**
Thawing time, 45 min.	Thawing time, 11 min.
Current, 220 amperes	Current, 240 amperes
Pipe size, ¾ in.	Pipe size, ¾ in.
Length of pipe, 500 ft.	Length of pipe, 40 ft

Table III.

Largest current, 320 amperes	Total number of jobs, 138
Largest pipe, 2 in. Water Main	Total number of days, 10½
Smallest pipe, ½ in.	Least jobs in one day, 3
Longest pipe, length 500 ft.	Most jobs in one day, 20
Average pipe size, ¾ in.	Average jobs per day, 13 to 14
Longest time, 65 min.	K. W. hours per job, average 1.15
Shortest time, 1¼ min.	K. W. hours per day, about 15
Average time, 11 min.	Voltage used on pipes 55 to 110

Men used:

To make 2300 volt connections on poles, 2. To handle wires to frozen pipes, 1 or 2. Foreman, 1.

The reactance, which is to be used only in the low voltage circuit, may be constructed by coiling up a few turns of the No. 00 or No. 000 thawing wire around a core of laminated iron. Solid iron is unsatisfactory, but a bundle of small rods or wire, or strips of sheet iron, about six square inches in cross section, should be used. The iron should be arranged to form a closed path around one side of the coil, as shown in the sketch.

The reactance may be replaced with a water barrel rheostat, consisting of a 50 gallon barrel about two-thirds filled with water, to which has been added a few hand-fulls of salt, soda, or sal amoniac. One electrode of sheet iron about 20 in. square placed in the bottom

and another electrode movably suspended in the top of the solution will supply the necessary resistance in the secondary circuit. Lowering the upper electrode will increase the current.

Following are suggestions for two types of thawing outfits. Since the transformers are used for but a few minutes at each job, it is possible to use small ones and overload them 100% to 150%.

Material for Thawing Outfit No.1.

Transformer 10 to 20 K. W.—2300 to 110 volt.
2-2300 volt fuse cutouts.
1-500 ampere switch.
1 large current resistance or reactance.
1-500 ampere ammeter.
2 primary wires No. 10 weatherproof, about 250 ft. each.
2 reels for primary wires.
2 secondary wires No. 00 or No. 000. 75 and 125 ft.
2 pipe clamps.

Material for Thawing Outfit No. 2

D. C. generator, 400 to 500 ampere mavimum capacity.
1-500 ampere ammeter.
1-110 volt voltmeter.
Field rheostat.
2 primary wires No. 10 weatherproof about 250 ft. each.
2 reels for primary wires.
2 secondary wires No. 00 or No. 000. 75 and 125 ft.
2 pipe clamps.
Truck with gear attachment from engine to generator
or
Sled or wagon with gas engine connected to generator.

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